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ABSTRACT

On the assumption that the verbal complexity of written examination materials used to select personnel for a job should be similar to the verbal complexity of materials that must be read and understood on the job, the Flesch Reading Ease Index was applied to samples of the reading materials required for successful entry-level job performance in the Washington, D.C. Fire Department (DCFD). The use of the Flesch formula results in a single numerical index ranging from 0 to 100 that estimates the relative reading-ease level of written material. The higher the index, the easier the material it describes. A committee of three entry-level firefighters participated in the study, which analyzed only those materials actually necessary to their job performance. Results showed that the index for the required materials was 44, a level described as "difficult" and indicating a junior college educational level. (Five appendixes contain lists of the required written material for the entry-level firefighters, the sampling plan for the study, results of a DCFD study involving a simplified Flesch Reading Ease Index, the counting instructions packet for the Flesch formula, and the raw data compilation and computation sheet for the study.) (FL)

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READING EASE LEVEL OF D. C. FIRE DEPARTMENT WRITTEN MATERIALS REQUIRED FOR ENTRY-LEVEL JOB PERFORMANCE

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Reading Ease Level of D. C. Fire Department Written Materials
Required for Entry-Level Job Performance

Purpose of Study

The verbal complexity of written examination materials used to select for a job should be similar to the verbal complexity of materials that must be read and understood on the job. Various methods and formulas have been devised to estimate the reading level of written materials. One of these formulas, the Flesch Reading Ease Index, has been applied to samples of the reading materials required for successful entry-level job performance in the D. C. Fire Department (DCFD). The same formula will be applied to any written materials developed as part of a new selection examination for the DCFD. The comparison of Reading Ease Indexes will indicate whether the reading level of each written part is appropriate to the written material encountered on the entry-level firefighter job. Necessary adjustments to the reading level of the selection examination can thus be made in the developmental stages.

Direction of the Study

The reading level study was directed by Sandra S. Payne, a psychologist on the Personnel Research and Development Center team (from the Bureau of Policies and Standards, U. S. Civil Service Commission) working on the DCFD Firefighter Selection Examination Project. She designed the study, worked with the firefighters assigned to the study, performed the data analysis, and prepared the report of results.

DCFD Required Written Materials

A great many manuals, training guides, bulletins, and other written sources of information are used in the work of the DCFD firefighter. Some of these materials are prepared by the DCFD; some are nationally used materials. Only those materials which are actually necessary to the performance of the entry-level firefighter job in the DCFD were included in the reading level study. Written materials which are used to provide greater in-depth explanations or help to prepare the firefighter for promotion, but are not actually required for satisfactory job performance at the entry level, were not included. This was true even if the materials were widely read and used by firefighters in the DCFD. The Battallion Fire Chief of the DCFD Training School and the Deputy Fire Chief for Training carefully reviewed all written materials used by the DCFD and determined which met these criteria. The list of required materials is attached as Appendix A.

Flesch Reading Ease Index

Many formulas have been devised to estimate or judge the readability of written material; one of the most frequently used is the Flesch Reading Ease Index (Klare, 1963). This formula is based on sentence length and number of syllables per hundred words in samples from prose passages (Flesch, 1948). The Flesch formula was chosen for this study after a thorough review of the reading level measurement literature because of the strong research support for its validity and reliability (England, Thomas, & Paterson, 1953; Gilinsky, 1948; Hayes, Jenkins, & Walker, 1950; Hoffman, 1972; Peterson, 1956; Swanson & Fox, 1953) and its ease of computation. Additionally, it was felt that the formula could be easily adapted to the measurement of readability of multiple-choice test items.

The Flesch formula is applied as follows:

- systematically select 100-word samples from the material to be analyzed;
- compute the average number of words per sentence in each sample (sl);
- count the number of syllables per hundred words in each sample (wl);
- determine the average sl and wl for all the 100-word samples;
- apply in the following reading ease (RE) equation:

$$RE = 206.835 - .846(wl) - 1.015(sl)$$

Use of the Flesch Reading Ease formula results in a single numerical index which estimates the relative reading ease level of the material which was analyzed. The index ranges from 0 to 100. The higher the RE Index, the easier the material it describes. The most appropriate use of the RE Index is to compare the relative size of the indexes obtained from analysis of different materials. Flesch has developed descriptive tables of ranges of index values, however, which can also be useful in summarizing the results of a reading level analysis. The user should recognize that reading ability associated with a particular grade level is at best a gross estimate, and that attainment of a particular grade level does not always guarantee equivalent acquisition of reading skills. Flesch's descriptions are given in Table 1 (1949, p. 149).

Sampling of DCFD Required Written Materials

The Flesch formula requires that 100-word samples be selected from any length/ written materials. A careful sampling plan was designed to obtain adequate and fair samples from each of the materials on the list of DCFD required written materials. The plan included specific rules for each step of the sample selection process. The sampling plan is described in Appendix B.

The pages identified by the sampling plan were machine-copied and labeled as to source. All raw data was recorded directly on these sheets, and the sheets are included as part of the record of the reading level study.

Application of Flesch Formula to Required Written Materials

A committee of three entry-level firefighters in the DCFD counted the wl and sl data for the reading ease formula.[1] Each firefighter was given a packet of counting rules and examples, and given the opportunity to ask questions about the procedure. They also could ask questions of the psychologist directing the study at any time during their counting work. The counting rules and examples are given in Appendix D.

The firefighters were on active duty, and were required to respond to any alarms received during their work. Fortunately, few alarms interrupted the work sessions during the five-day project span. The counting was done in a quiet, out-of-the-way room in the fire station. Work sessions seldom lasted more than four hours, with intermittent breaks being taken to reduce fatigue and its possible increase in error level.

TABLE 1

Difficulty Levels and Associated Educational Levels for Flesch Reading Ease Indexes

Index Range	Difficulty Level	Educational Level
100 - 90	very easy	5th
90 - 80	easy	6th
80 - 70	fairly easy	7th
70 - 60	standard	8th & 9th
60 - 50	fairly difficult	10th to 12th
50 - 30	difficult	13th to 16th (college)
30 - 0	very difficult	college graduate

[1]Counts were also made of the number of one-syllable words in each 100-word sample (nosw). This count was made for the computation of a simplified version of the Flesch formula. The use of this formula is discussed in Appendix C.

The sl and wl counts were recorded directly on each sample page, as indicated in the counting examples included in Appendix D. The firefighters were told to work slowly and accurately; and that since the work would not all be checked, they were responsible for reaching the highest level of accuracy they could.

Random checking of the firefighters' sample counts was done. Generally the counts were found to be highly accurate. A few consistent errors were noted in the first few work days in the syllable counts of certain words. These systematic errors were corrected on all samples.

Occasionally the spot checking indicated enough error in a group of pages from one individual to require recounting of all samples included in that group. Recounting was done on each such sample page until a high level of accuracy was reestablished.

The computation of average sl for each sample and the application of raw data in the formula was done by the psychologist. A sample of the form used for raw data compilation and computation is shown in Appendix E.

Reading Level Analysis Results

The Flesch Reading Ease Index for all of the DCFD required written materials is a 44. In terms of difficulty and associated educational level as estimated by Flesch, the average level of the required written material is described as "difficult" material at about the 14th grade (junior college) level.

The required written materials varied considerably in their individual reading ease levels. They ranged from a low difficulty RE Index of 75 to a high difficulty RE Index of 25. The indexes for each of the reading materials are summarized in Table 2.

TABLE 2

Reading Ease Levels of DCFD Required Written Materials

Title	wl	sl	RE Index
Rules and Regulations of the DCFD	175.40	32.81	25
Official DCFD Bulletins	176.91	29.98	27
DCFD Order Book	172.09	30.90	30
DCFD Probation Book	177.50	26.36	20
General Orders, Special Orders, and Memorandums	175.23	24.10	34
The Firefighter and Electrical Equipment	174.15	18.29	41
Metro Information and Procedures, DCFD	172.95	19.15	41
Emergency Care and Transportation of the Sick and Injured	160.85	18.17	52
DCFD Gas Mask Manual	160.81	18.17	52
Official Aerial Ladder Truck Operating Procedure, DCFD	157.33	17.67	56
Pump Operating Procedure, DCFD	155.37	18.75	56
Official Training Procedure, DCFD	151.21	19.74	59
Rescue Skills and Techniques	136.60	16.[illegible]	75
(Averages)	(165.10)	(22.35)	
ALL REQUIRED WRITTEN MATERIAL			44

Application of Flesch Formula to Examination Materials

Written material will possibly appear in many places in the final selection examination. Many directions and instructions for the candidates will be in written form. The total examination may also include a written test. All written material included in any part of the examination will be analyzed to determine if it is at an appropriate reading difficulty level. The Flesch formula can be easily applied to any peripheral written material developed for the examination. The same counting and sampling procedures as previously described will be used.

The following specific adjustments to the formula application procedures will be made, however, if the reading level of a written test needs to be determined. The entire test form will be analyzed, rather than selected 100-word samples. All test directions appearing on the test form will be included in the analysis.

If a written test is included in the examination, it will probably be in the multiple-choice item format. The counting rules must be adapted to the specific requirements of multiple-choice items.[2] (If some other test item format is used, the counting rules will be appropriately adapted to that format.) Word length (wl) will be counted for every word appearing on the test copy, including test directions, item stem, all five answer choices, and any miscellaneous words. The wl for the reading ease formula will be determined as follows:

$$wl = \frac{\text{total number of syllables in total words}}{\text{total number of words}} \times 100$$

The sentence length (sl) count will be adapted as follows. Each item stem and its keyed correct answer is counted as one complete sentence. Any complete sentences prior to the question in the item stem are also included in the average sentence length count, as are the sentences in the test directions. In addition, if the answer choices to an item are phrased and punctuated as complete sentences, they are included in the sentence length count. Thus all complete sentences, including the implied sentence composed of an item stem and its intended completion, are used to compute the average sentence length (sl). The sl for the reading ease formula is then determined as follows:

$$sl = \frac{\text{number of words appearing in complete sentences}}{\text{number of complete sentences}}$$

The counting and formula computations will be done by the psychologist. All counting and computation will be performed twice, and redone whenever a discrepancy in the results is found.

Summary

The Flesch Reading Ease Index formula was used to estimate the reading level of the written materials required for entry-level job performance in the DCFD. The average level of the required written materials is described as "difficult" material at about the 14th grade (junior college) level. The procedures for determining and comparing the reading levels of any written examination materials to be developed as part of the DCFD Selection Examination Project are detailed.

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[2] Previous use of the Flesch Reading Ease Index in research on reading level of test items appears to have generally relied only upon the item stem and a single answer choice (Botterbusch, 1967; Johnson & Bond, 1950; Washington State, 1973). Incorrect answers and test directions are not included in the wl and sl counts. This approach leaves a considerable portion of a multiple-choice test form's syllabication measurement uncounted, and may inappropriately estimate average sentence length. For these reasons, the psychologist devised the new set of counting rules for multiple-choice tests used in this study.

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Appendix A:

DCFD Reading Level Study
April 1976

Required Written Materials
Entry-Level Firefighter in the DCFD

The following list of required written materials was prepared by B.F.C. Joseph R. Granados, DCFD Training School, and D.F.C. John P. Devine, Training Division. All materials on the list must be read and understood by the entry-level firefighter (as defined in the approved selection project proposal) in order to perform the duties of the job. Non-required materials are not included.

1. Official Training Procedure, D.C.F.D.
2. Fire Department Order Book, D.C.F.D.
3. Rules and Regulations Governing the Fire Department of the District of Columbia
4. Pump Operating Procedure, D.C.F.D.
5. Official Aerial Ladder Truck Operating Procedure, D.C.F.D.
6. Gas Mask Manual, D.C.F.D.
7. The Firefighter and Electrical Equipment
8. Official Fire Department Bulletins, D.C.F.D.
9. Rescue Skills and Techniques,
   Chapter 2, Sections 2.10 - 2.18 and 2.40 - 2.55
10. Emergency Care and Transportation of the Sick and Injured
11. Probation Book, D.C.F.D.
12. General Orders, Special Orders, and Memorandums--a collection of those current
13. Metro Information and Procedures, D.C.F.D.

Appendix B:

DCFD Reading Level Study

Sampling Plan:

Books with less than 20 pages	--	every page
Books with 21 to 50 pages	--	every 3rd page
Books with 51 to 100 pages	--	every 5th page
Books with more than 100 pages	--	every 10th page

Sampling Rules:

1.) Start with the first page of the text (not the table of contents, acknowledgements, foreword, etc.)

2.) Copy each page as it is selected for the sample, according to the above plan. Note on the bottom of the page the name of the book it is taken from.

3.) Count to the next sample page. If that page shows only a diagram, table, chart, etc., copy that page, but also copy the next following page that has a complete reading sample. If there is both writing and other material on a sample page, or if the page contains only a few short sentences, roughly check to make sure there is a complete 100-word sample on the page. If not, copy the following page with writing so that the 100-word sample may be completed. Remember as you make this check that the 100-word samples will always start with the first word of the first paragraph beginning on the page.

4.) If you skip a page because it is not a suitable sample, count from the page that should have been used to determine the next sample page. Don't start counting from the substitute sample page.

5.) Clip together the sample pages from each book, with a copy of the book cover on the top. Each page must still be identified with book title (and page number if it does not appear on the copy). Be sure that the copy of the book cover identifies which edition or date of issue was used, if applicable. If it doesn't, add this information.

6.) Make a copying machine sample set even of books that have less than twenty pages, as the counting of 100-word samples will be done directly on the copied pages, and will become a part of the record of the reading level study.

Appendix C:

Use of Simplified Flesch Reading Ease Index in
DCFD Reading Level Study

Description of the Simplified Formula

In 1951, Farr, Jenkins, and Paterson suggested a simplified version of the Flesch Reading Ease formula. Instead of counting the total number of syllables (wl count) in the 100-word prose samples, only the number of one syllable words (nosw count) in the 100-word samples are counted. The sl count remains the same as in the original Flesch formula. The simplified reading ease formula is:

$$RE \text{ (Farr)} = 1.599(nosw) - 1.015(sl) - 31.517$$

The raw data for the simplified formula is simpler to count, and presumably therefore more error-free than the original (Dunnette & Maloney, 1953). The research shows the simplified version to have high correlation with the original Flesch formula (Farr, Jenkins, & Paterson, 1951), and to have high reliability (Farr, Jenkins, Paterson, & England, 1952).

Application to DCFD Reading Level Study

The original reading level study plan called for using the simplified Flesch Reading Ease formula. However, before the actual counting phase was started, the psychologist made several sample comparisons of the two formulas on the DCFD materials. Some real differences in the results obtained from the two methods were evident. Hypothesizing that significant differences might exist due to some factor related to the content of firefighter-related materials, the psychologist decided to compute both reading ease formulas. The original Flesch formula, having the greater weight of research and use behind it, would be used as the primary method for the reading level study. The simplified indexes would either serve to confirm the results of the main study, or would provide the basis for research into causes for the different results. The nosw counts were made at the same time as the wl counts. No extra project time was necessary to do this additional count, as counting first the one syllable words, and then the number of syllables in multi-syllable words, is one recommended way of obtaining the wl count in an accurate manner.

Results

The reading level index for all of the DCFD required written material according to the simplified formula is a 41. This index falls within the same descriptive range as the original Flesch formula index, although it indicates a slightly more difficult reading level. However, real differences evidently do exist in the indexes obtained by the two different methods. The obtained means and standard deviations for the Flesch and Farr indexes were 43.969 and 21.354, and 39.667 and 18.629, respectively.[1] Although the two sets of indexes were highly correlated ($r = .82$, $p < .001$), a test of the significance of the difference between the two means was highly significant, $t\ (257) = 5.704$, $p < .001$. Further research in this area is indicated.

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[1]Note that the means of the individual 100-word sample indexes are not the same as the indexes computed by combining the raw data from all the samples to determine the overall reading level of the required DCFD written materials; nor should they be the same.

References

Dunnette, M. D., & Maloney, P. W. Factorial analysis of the original and simplified Flesch reading ease formulas. Journal of Applied Psychology, 1953, 37, 107-110.

Farr, J. N., Jenkins, J. J., & Paterson, D. G. Simplification of Flesch reading ease formula. Journal of Applied Psychology, 1951, 35, 33-337.

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Appendix D:

Counting Instructions Packet

DCFD Reading Level Study

Counting Instructions:

1. Work slowly and carefully; accuracy is very important. Recount if you have any doubt that the count is correct.

2. Mark the counts directly on each sample page.

3. Use the red pencils provided.

4. Do the Word Length count first; then the Sentence Length. Specific instructions for each are given below.

5. Ask questions if you are unsure of the sample counts you obtain.

6. Look at the examples included in this Instructions Packet. Make your own count and see if it corresponds to the count on the example page.

Word Length

1. Starting with the first word of the first paragraph beginning on each sample page, count off 100 words. Mark the beginning of the 100-word sample with a slash and the end with a slash. Do not count section or paragraph headings as part of the 100 words. Go into the next paragraph(s) to complete the 100-word count if necessary. Indicate any material not included in the 100-word count by enclosing it in brackets. Count as words numbers or letters separated by space. Count contractions or hyphenated words as one word. If a table or diagram interrupts the text before the 100-word count is completed, go on to the next full sentence(s) appearing on the sample page. Do not count words or sentences which are part of tables or figures in the 100-word count.

2. Count the number of one-syllable words in the 100-word sample. Put that number in the right margin of the sample page, and indicate that the sample contained 100 words, e.g., 64/100.

3. Count the <u>total</u> number of syllables in the 100-word sample. Put that number in the right margin below the one-syllable word count, e.g., 153/100. To save time, count the number of syllables in all multi-syllable words and add that to the one-syllable word count done in Step 2.

4. If in doubt about the number of syllables in a word, consult the dictionary. It is also helpful to silently "read aloud" to determine the number of syllables. Count the number of syllables in symbols, numbers, or abbreviations according to the way they are normally read aloud, e.g., three syllables for "gpm", two for "%", four for "1918" (nineteen-eighteen). If a passage contains more than five lengthy figures (three or more digits), stop counting the figures after the fifth. Enclose the skipped figures in brackets. Be sure to then add a corresponding number of words to the 100-word sample.

Sentence Length

1. Starting at the same point as the word length sample, count a sentence sample as close to 100 words long as possible. Include only complete sentences. This may be done at the same time as the 100-word sample count is done. Mark the end of the sentence sample with an X. The sentence sample can be either shorter or longer than 100 words; pick the sentence end that is closest to 100 words. Put the total number or words in the sentence sample under a division sign in the right margin of the sample page, e.g., $\overline{)108}$.

2. Count the total number of sentences in the sample. Count as sentences phrases separated by colons or semi-colons. Do not, however, separate phrases connected by "and" or "but" or other conjunction, or divided by commas. Count as separate sentences only those phrases divided by periods, colons, semi-colons, or spaced on new lines on the page.

3. Put the total number of sentences outside the division sign in the right margin, e.g., $6\overline{)108}$.

Do not count headings → CHAPTER I

THE CENTRIFUGAL FIRE PUMP

58/100

179/100

3|184

A pump can be described as "any of various mechanical devices which utilize an external source of power to apply a force to a liquid or gas." There are many types of these devices, each suited to a particular purpose, with none universally best for all applications. Pumps can be generally categorized into two basic groupings, according to whether they discharge liquid or gas in volumes separated by a period of no discharge (called positive displacement), or in a continuous flow (called non-positive displacement). X

end of sentence count →

A positive displacement pump in operation, discharges a definite volume of *liquid or gas* in each cycle of pump operation, provided that the motive force driving the pump is greater than any resistance offered to the movement of the material being acted upon. If the discharge outlet of a positive displacement type pump, when pumping an incompressible material, were completely closed, either the driving force would be stalled, or something would break.

end of 100-word count

A non-positive displacement pump in operation, discharges a volume of *liquid* in each cycle of operation which is dependent upon the resistance offered to the movement of the liquid being pumped. This type of pump exerts a force upon the liquid that is constant for any given speed of the pump. When a resistance equal to the force being exerted by the pump is presented to its discharge, the material reaches a state of equilibrium and does not move. Nothing more will happen, except that the pump will churn the liquid thereby generating heat.

One type of non-positive displacement pump applies an action to liquids by rotating them in such a manner as to achieve a centrifugal force (the force tending to make rotating bodies move away from the center of rotation). This type of pump is referred to as a "centrifugal pump." The basic principles of how a centrifugal pump develops velocity and pressure, as well as the basic designs of a centrifugal pump, are explained in this Chapter.

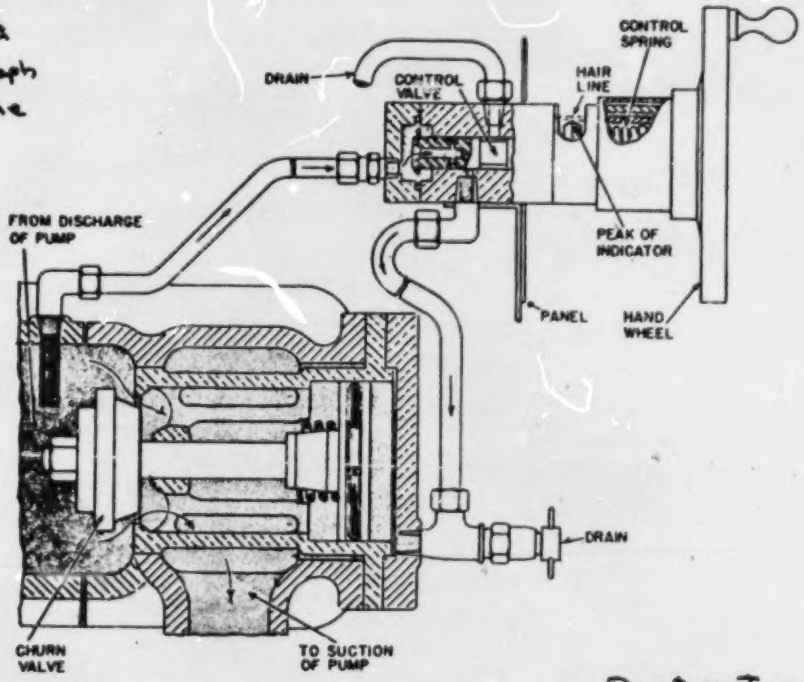
If a small amount of water were placed at the center of a rapidly rotating turntable, Figure 1, page 2, it would be thrown off. In other words, the turntable would impart horizontal radial velocity to the water. The faster the turntable was rotated, the further the water would be thrown, or the more velocity imparted to the water.

Do not start in the middle of a paragraph. Start below the first paragraph beginning on the sample page.

[churning. With this relatively constant load on the engine, its speed remains relatively constant, thus maintaining the pressure for which the relief valve is set.]

64/100

161/100



4 | 83

counts as one word, 8 syllables

[FIGURE 16. HALE RELIEF VALVE]

Do not count words in figure or figure headings in 100-word count

The Hale QL75HD pump is equipped with a Hale relief valve, Figure 16. The complete relief valve assembly consists of a churn valve, which is contained within the configuration of the main pump body; and a control valve, which is mounted in a convenient operating position on the side control panel of the apparatus.

The churn valve resembles a large double-ended piston with unequal face areas, i.e., the flat area on one end is larger than the flat area on the other end. This valve operates in such a manner that when pressure is applied at the larger end of the piston, it moves, and the other end opens a passageway between the discharge side and the suction side of the pump.

end of sentence count

end of 100-word count

PUMP OPERATING PROCEDURE

The Waterous CA-5 pump is equipped with the Waterous relief valve, Figure 25. The complete relief valve assembly consists of a churn valve, referred to in Figure 25 as the main valve; and a control valve, referred to in Figure 25 as the pilot valve. These two valves are mounted externally on the pump housing, with piping connections into both the suction and discharge sides of the pump. Each valve has a controlling handle mounted in a convenient operating position on the side control panel of the apparatus.

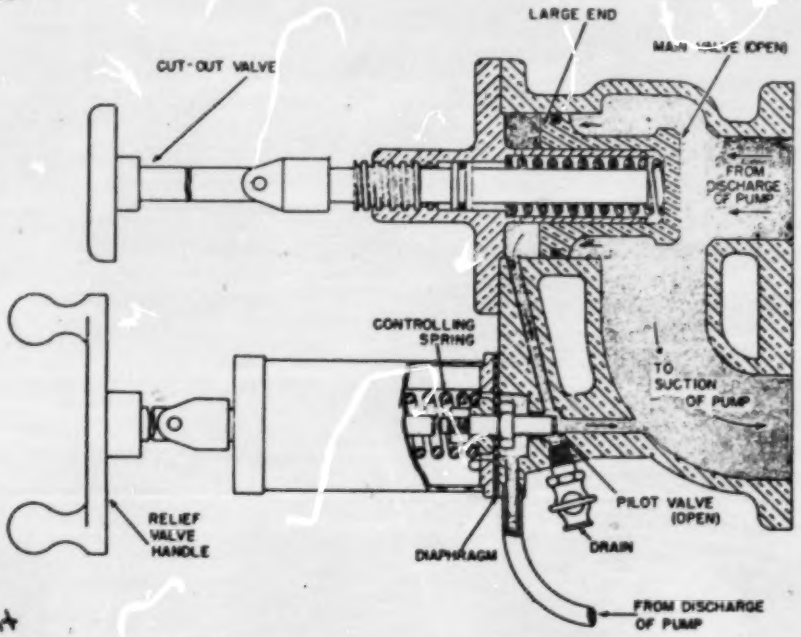


FIGURE 25. WATEROUS RELIEF VALVE

The churn valve resembles a large double ended piston with unequal face areas, i.e., the flat area on one end is larger than the flat area on the other end. This valve operates in such a manner that when equal pressures are on both ends of the piston it remains closed; and when the pressure is reduced at the larger end of the piston it moves, and the other end opens a passageway between the discharge side and the suction side of the pump. A spring holds the valve in a closed position when there is no pressure in the pump.

This is almost like a table of contents; do not use as a reading sample. Start with first paragraph.

The 1954 Pirsch; Serials 176, 278, 279, and 280; is equipped with the Hale QL75HD two stage series-parallel centrifugal pump. 58/100

The description of the physical characteristics of the pump will be found in Chapter I on pages 23 through 26 inclusive. 162/100

The description of the priming system will be found on pages 26 and 27.

The description of the lubrication for the pump and associated equipment will be found on pages 27 and 28. 5 197

The description of the relief valve will be found on pages 28 through 35 inclusive.

Auxiliary Cooling System

The normal cooling system may be inadequate to keep the engine from overheating on a lengthy pumping job. Therefore, pumpers and hose wagons are equipped with an auxiliary cooling system connected by piping to the pump. On the 1954 Pirsch, this unit is located above the engine near the radiator, and consists of a coil of tubing contained within a metal shell. Water from the radiator is circulated around the tubing. Water from the pump flows through the coil of tubing, absorbs the heat from the radiator water, and returns to the suction side of the pump. There is a valve, COOLER, in the piping between the pump and the auxiliary cooling coil, and this valve is normally kept in the open position so that circulation of water will occur in the auxiliary cooling system. Figure 39, page 155, is a drawing of the auxiliary cooling unit used on this model of Pirsch.

There is also a valve, RAD. FILL, provided to admit water from the pump directly to the radiator. This valve is located in piping tapped into the pump housing. Care shall be exercised not to subject the radiator to excessive pressure. When using this valve the radiator cap shall be removed to eliminate any possibility of bursting the radiator.

The Control Panel

Figure 34, page 104, is a photograph of the control panel of the 1954 Pirsch, Serial 176. Serials 278, 279, and 280 have a similar control panel.

The 4½ inch suction intake is shown near the lower center reduced to 2½ inch and gated.

Count each phrase typed on a new line as a sentence, unless part of previous sentence or phrase

WARD LaFRANCE

1955

54 /100

151 /100

[OPERATING FROM HYDRANT]

/Step 1—Making Pump Ready

Locate pumper at hydrant
Connect soft sleeve
Connect hose line
Check gates—closed
Open suction valve
(Front or rear intake)
Open hydrant fully

21 | 97

part of previous sentence or phrase →

Step 2—Getting Water

Determine hydrant static pressure—open gate
In seat—with clutch depressed:
Place road transmission in 4th
Move pump lever back. Engage clutch
At side—pull out clutch control:
Move pump lever to pump, P; push in clutch control

Step 3—Pumping

Select position of transfer valve—volume or pressure
If necessary, increase relief valve setting
Adjust throttle until desired pressure is reached
Set relief valve X
Observe gauges—suction, discharge, temperature, tachometer, oil pressure
As additional lines are supplied, make necessary adjustments—discharge pressure and relief valve

end of sentence count
end of 100-word count

Step 4—Shutting Down

Lower pressure slowly
Close gate—drain hose line
At side—pull out clutch control:
Move pump lever to neutral, N; push in clutch control
In seat—with clutch depressed:
Move pump lever forward
Return road transmission to neutral. Engage clutch
Shut down hydrant
Close suction valve
(Front or rear intake)
Disconnect soft sleeve and hose line
Return controls and valves to normal position

Appendix E:

DCFD Reading Level Study

Raw Data Compilation and Computation Sh.et

Page #	RE_{Flesch}	wl	sl	nosw	RE_{Farr}	Total RE_{Flesch}	Total RE_{Farr}
12	29	177	28.0	58	33		
13	50	161	20.75	64	50		
14	53	161	17.6	59	45		
15	50	162	19.4	58	42		
16	74	151	4.61	54	50		
Raw Totals		812	90.36	293			
N		5	5	5			
Averages		162.4	18.07	58.6			
	$206.83 - .846(162.4)_{wl} - 1.015(18.07)_{sl} =$						
	$206.83 - 137.39 - 18.34 =$					51.10	
	$1.599(58.6)_{nosw} - 1.015(18.07)_{sl} - 31.517 =$						
	$93.70 - 18.34 - 31.517 =$						43.84
Book Title: Reading Study Report Samples						51	44

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